claims

1. A personal authentication method using iris images, comprising a registration process and an authentication process,

5   the registration process including the steps of:

acquiring an iris image from a registrant;

obtaining feature data and a pupil opening degree index from the acquired iris image; and

performing data registration for the registrant in an iris database

10   using the obtained feature data and pupil opening degree index, and

the authentication process including the steps of:

acquiring an iris image from a person to be authenticated;

obtaining feature data and a pupil opening degree index from the acquired iris image;

15   obtaining feature data to be collated by referring to data registered for a registrant in the iris database with the pupil opening degree index obtained in the authentication process; and

comparing the feature data to be collated with the feature data obtained in the authentication process to determine whether or not the person to be

20   authenticated is identical to the registrant.

2. The personal authentication method of claim 1, wherein:

the registration process includes the step of registering the feature data together with the pupil opening degree index in the iris database in conjunction with

25   the registrant; and

the authentication process includes the step of specifying the feature

data to be collated from feature data registered in the iris database in conjunction with a registrant by comparing the pupil opening degree index obtained in the authentication process with the pupil opening degree index registered together with the feature data.

3. The personal authentication method of claim 2, wherein the registration process includes the step of at least registering three pieces of feature data of the registrant obtained from iris images in a pupil-contracted state, in a normal state, and in a pupil-dilated state, respectively.

4. The personal authentication method of claim 2, wherein the registration process includes the steps of:

acquiring a plurality of iris images having different pupil opening degrees from the registrant;

obtaining feature data from each of the plurality of acquired iris images; and

collating the plurality of pieces of feature data with each other to select feature data to be registered in the iris database from the plurality of pieces of feature data.

5. The personal authentication method of claim 2, wherein the authentication process is aborted when feature data having a pupil opening degree index which is close to the pupil opening degree index obtained in the authentication process by a predetermined difference is not registered for the registrant.

6. The personal authentication method of claim 5, wherein when the authentication

52

process is aborted,

a preferable condition for capturing an iris image is estimated based on the pupil opening degree index obtained in the authentication process and a pupil opening degree index associated with registered feature data, and

5   the person to be authenticated is advised to re-acquire an iris image under the estimated capturing condition.

7. The personal authentication method of claim 1, wherein

the registration process includes the steps of:

10   acquiring a plurality of iris images having different pupil opening degrees from the registrant;

obtaining a relational expression between feature data and a pupil opening degree index based on a plurality of pieces of feature data and pupil opening degree indices obtained from the plurality of acquired iris images; and

15   registering parameters for expressing the relational expression in the iris database in conjunction with the registrant, and

the authentication process includes the step of obtaining a relational expression from parameters registered in the iris database in conjunction with a registrant and assigning the pupil opening degree index obtained in the

20 authentication process to the relational expression to obtain the feature data to be collated.

8. The personal authentication method of claim 7, wherein:

the registration process includes the step of thinning the parameters

25 before registration; and

the authentication process includes the step of restoring the thinned

parameters by interpolation.

9. The personal authentication method of claim 1, wherein

the registration process includes the steps of:

acquiring a plurality of iris images having different pupil opening degrees from the registrant;

specifying registration feature data from a plurality of pieces of feature data obtained from the plurality of acquired iris images and obtaining a transformation rule for transforming the registration feature data to another feature data having a different pupil opening degree index; and

registering the registration feature data and the transformation rule in the iris database in conjunction with the registrant,

the authentication process includes the step of generating the feature data to be collated using the pupil opening degree index obtained in the authentication process based on feature data and a transformation rule registered in the iris database in conjunction with a registrant.

10. The personal authentication method of claim 1, wherein the pupil opening degree index is the ratio of a pupil diameter to an iris diameter in an iris image.

11. A personal authentication method using iris images, comprising:

the first step of acquiring an iris image from a person to be authenticated;

the second step of obtaining feature data and a pupil opening degree index from the iris image obtained at the first step;

the third step of obtaining feature data to be collated by referring to data

54

registered for a registrant in an iris database in which data registration has been done using pupil opening degree indices with the pupil opening degree index obtained at the second step; and

5   the fourth step of comparing the feature data to be collated which is obtained at the third step with the feature data obtained at the second step to determine whether or not the person to be authenticated is identical to the registrant.

12. The personal authentication method of claim 11, wherein:

10   the iris database stores at least one piece of feature data for each registrant together with a pupil opening degree index; and

at the third step, a pupil opening degree index registered together with the feature data, which is selected from the at least one piece of feature data registered in the iris database in conjunction with the registrant, is compared with

15 the pupil opening degree index obtained at the second step to specify the feature data to be collated.

13. The personal authentication method of claim 11, wherein:

the iris database stores parameters which express a relational

20 expression between feature data and a pupil opening degree index for each registrant; and

at the third step, a relational expression is obtained from the parameter registered in the iris database in conjunction with a registrant, and the pupil opening degree index obtained at the second step is assigned to the relational expression,

25 whereby the feature data to be collated is obtained.

14. The personal authentication method of claim 11, wherein:

the iris database stores feature data and a transformation rule for transforming the feature data to another feature data having a different pupil opening degree index for each registrant; and

5   at the third step, the feature data to be collated is generated using the pupil opening degree index obtained at the second step based on the feature data and the transformation rule registered in the iris database in conjunction with a registrant.

10   15. An iris registration device which performs data registration for iris authentication, comprising:

means for acquiring an iris image from a registrant;

means for obtaining feature data and a pupil opening degree index from the iris image; and

15   means for performing data registration for the registrant in an iris database using the feature data and the pupil opening degree index.

16. An iris authentication device which performs personal authentication using iris images, comprising:

20   means for acquiring an iris image from a person to be authenticated;

means for obtaining feature data and a pupil opening degree index from the iris image;

means for obtaining feature data to be collated by referring to data registered for a registrant in an iris database in which data registration has been

25   done using pupil opening degree indices with the obtained pupil opening degree index; and

56

means for comparing the feature data to be collated with the feature data to determine whether or not the person to be authenticated is identical to the registrant.

5   17. A program for instructing a computer to execute personal authentication using iris images, comprising the steps of:

obtaining feature data and a pupil opening degree index from an iris image acquired from a person to be authenticated;

obtaining feature data to be collated by referring to data registered for a

10   registrant in an iris database in which data registration has been done using pupil opening degree indices with the obtained pupil opening degree index; and

comparing the feature data to be collated with the feature data to determine whether or not the person to be authenticated is identical to the registrant.

15